

REMARKS

I. Introduction

By the present Amendment, claims 1, 7, and 13 have been amended. No claims have been added or canceled. Accordingly, claims 1-18 remain pending in the application. Claims 1, 7, and 13 are independent.

II. Office Action Summary

In the Office Action of December 27, 2005, claims 1-18 were rejected under 35 USC §103(a) as being unpatentable over U.S. Patent No. 6,327,022 issued to Nishi in view of U.S. Patent No. 6,544,721 issued to Saitoh, and further in view of U.S. Patent No. 6,103,428 issued to Hatai, et al. ("Hatai"). These rejections are respectfully traversed.

III. Rejections under 35 USC §103

Claims 1-18 were rejected under 35 USC §103(a) as being unpatentable over Nishi in view of Saitoh and Hatai. Regarding this rejection, the Office Action alleges that Nishi discloses various features of the claimed invention. The Office Action admits, however, that Nishi does not disclose several features recited in the independent claims. For example, the Office Action admits that Nishi fails to disclose the reticles being phase-shifting masks and the phase of the light passing through the first phase-shift mask pattern is inverted from that of the second phase-shift mask pattern. The Office Action also admits that Nishi fails to disclose auxiliary patterns formed around the first and second mask patterns. Further, the Office Action admits that Nishi fails to disclose the first and second phase shift mask having a substrate groove shifter. The Office Action first places reliance on Saitoh for

disclosing phase shifters formed in the first and second mask and the feature of light transmitted through the first mask pattern being inverted relative to the light passing through the second mask pattern. The Office Action further admits that the combination of Nishi and Saitoh still fails to disclose the auxiliary patterns being formed on the mask. Hatai is additionally relied upon for disclosing auxiliary patterns that are formed on the mask patterns. Applicants respectfully disagree.

As amended, independent claim 1 defines a method of manufacturing semiconductor integrated circuit devices that comprises, in part, the steps of:

wherein the first phase shift mask pattern has a first layout pattern comprising a plurality of hole patterns and a hole pattern surrounded by auxiliary patterns,

wherein the second phase shift mask pattern has a second layout pattern comprising a plurality of hole patterns and a hole pattern surrounded by auxiliary patterns,

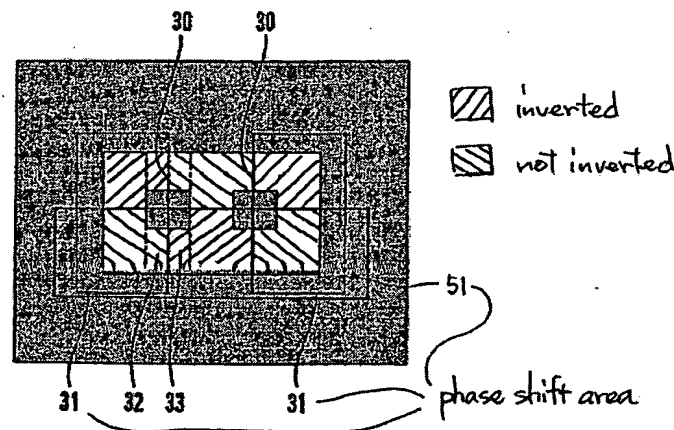
wherein the first layout pattern is the same as the second layout pattern, and

wherein a phase of the light passing through all of the hole patterns of the first layout pattern is inverted from a phase of the light passing through all of the hole patterns of the second layout pattern corresponding to the hole pattern of the first layout pattern.

According to the method of independent claim 1, the first phase shift mask pattern has a first layout pattern that comprises a plurality of hole patterns and a hole pattern that is surrounded by auxiliary patterns. Likewise, the second phase shift mask has a second layout pattern that comprises a plurality of hole patterns and a hole pattern surrounded by the auxiliary patterns. The first and second layout patterns are configured such that they have identical pattern arrangements. Furthermore, the phase of light passing through all of the hole patterns of the first layout pattern is inverted from a phase of the light passing through all of the hole patterns of the second layout pattern.

The Office Action alleges that the combination of Nishi, Saitoh, and Hatai renders the claimed invention obvious. Applicants' review of the references, however, suggests otherwise. As admitted in the Office Action, Nishi fails to disclose numerous features that are recited in independent claim 1. Additionally, the Office Action goes on to admit that the combination of Nishi and Saitoh fails to disclose certain features recited in independent claim 1. As amended, however, independent claim 1 also recites additional features that are not disclosed by the combination of Nishi and Saitoh.

Saitoh appears to disclose a method for exposing a resist or substrate in manufacturing a semiconductor device by using phase shifting masks arranged to make multiple exposures in order to obtain a desired circuit pattern. The masks are arranged such that phase-shift areas are formed in different locations to provide the phase-shifting effect. However, Saitoh discloses a first mask pattern of a first mask in Fig. 3 that is identical to a second pattern of a second mask (Fig. 5). However, the configuration of Saitoh only inverts the phase of light passing through certain portions of the mask patterns. In order to better illustrate this situation, Applicants have superimposed the patterns illustrated in Figs. 3 and 5 below.



As can be seen, the phase shift area does not invert all of the light. In contrast, the phase of light passing through all patterns of independent claim 1 is reversed. This is clearly illustrated in Fig. 33.

Hatai appears to disclose a photomask that utilizes an auxiliary pattern that is not transferred with the resist mask. Hatai incorporates a chrome pattern that serves as a mask pattern. The chrome pattern is formed so that it is substantially equivalent to a wavelength of exposure light at an interval substantially equivalent to a wavelength. Hatai does not appear to provide a multiple exposure method even though an auxiliary pattern is disclosed. The combination of Nishi, Saitoh, and Hatai still fails to disclose features of independent claim 1, such as:

wherein the first layout pattern is the same as the second layout pattern, and

wherein a phase of the light passing through all of the hole patterns of the first layout pattern is inverted from a phase of the light passing through all of the hole patterns of the second layout pattern corresponding to the hole pattern of the first layout pattern.

Applicants further submit that the Office Action has not set forth a *prima facie* case of obviousness. As is known, there are three basic criteria that must be met. First, there must be some suggestion or motivation in the primary reference to modify, combine, or seek out the teachings of a secondary reference. Second, there must be a realistic expectation of success from combining the two references. Finally, the prior art references must clearly teach or suggest all the claim limitations.

In the present case, the Office Action provides no indication as to where, or how, Nishi provides motivation for seeking out the teachings of Saitoh. There is also no indication as to why one skilled in the art would further seek out the teachings of Hatai, particularly upon failing to arrive at the claimed invention using the

combination of Nishi and Saitoh. It appears that hindsight is being used as a blueprint to piecewise assemble references that disclose individual features of the claimed invention. Such hindsight reconstruction is clearly impermissible.

It is therefore respectfully submitted that independent claim 1 is allowable over the art of record.

Claims 2-6 depend from independent claim, and are therefore believed allowable for at least the reasons set forth above with respect to independent claim 1. In addition, these claims each introduce novel elements that independently render them patentable over the art of record.

Independent claims 7 and 13 define additional methods of manufacturing semiconductor integrated devices. These claims each recite features that are somewhat similar to those recited in independent claim 1. More particularly, independent claims 7 and 13 each expose a wafer using first and second phase-shift masks with the features of:

wherein the first layout pattern is the same as the second layout pattern, and

wherein a phase of the light passing through all of the hole patterns of the first layout pattern is inverted from a phase of the light passing through all of the hole patterns of the second layout pattern corresponding to the hole pattern of the first layout pattern.

As previously discussed with respect to independent claim 1, these features are not disclosed or suggested by the art of record. It is therefore respectfully submitted that independent claims 7 and 13 are allowable over the art of record.

Claims 8-12 depend from independent claim 7, and claims 14-18 depend from independent claim 13. Accordingly, these claims are also believed allowable for at least the reasons set forth above with respect to independent claims 7 and 13. In

addition, these claims each introduce novel elements that independently render them patentable over the art of record.

IV. Conclusion


For the reasons stated above, it is respectfully submitted that all of the pending claims are now in condition for allowance. Therefore, the issuance of a Notice of Allowance is believed in order, and courteously solicited.

If the Examiner believes that there are any matters which can be resolved by way of either a personal or telephone interview, the Examiner is invited to contact Applicants' undersigned attorney at the number indicated below.

AUTHORIZATION

Applicants request any shortage or excess in fees in connection with the filing of this paper, including extension of time fees, and for which no other form of payment is offered, be charged or credited to Deposit Account No. 01-2135 (Case: 1374.39158CX1).

Respectfully submitted,
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